



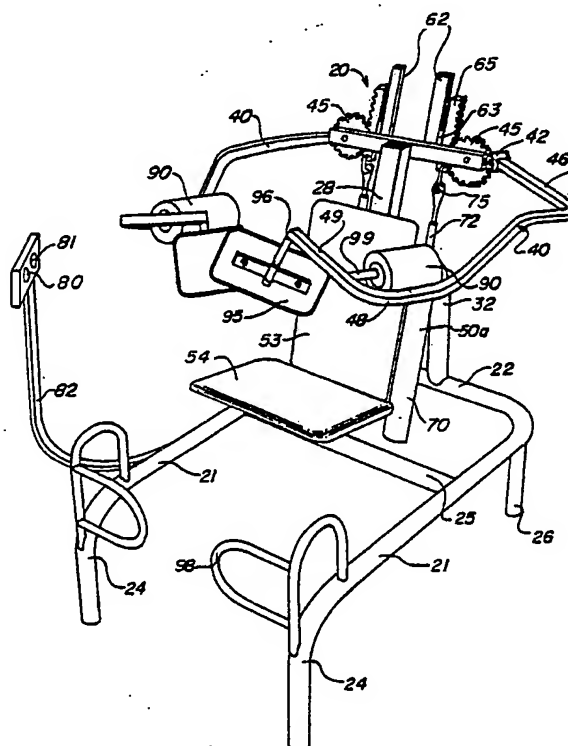
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US84/01582 (22) International Filing Date: 1 October 1984 (01.10.84) (31) Priority Application Number: 537,800 (32) Priority Date: 30 September 1983 (30.09.83) (33) Priority Country: US (71) Applicant: HYDRA-GYM ATHLETICS, INC. [US/US]; 2121 Industrial Park, P.O. Box 599, Belton, TX 76513 (US). (72) Inventor: BRENTHAM, Jerry, Don ; 2121 Industrial Park, P.O. Box 599, Belton, TX 76513 (US). (74) Agents: CRUTSINGER, Gerald, G. et al.; Crutsinger, Booth & Ross, 1000 Thanksgiving Tower, Dallas, TX 75201 (US).		(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), SE (European patent). Published With international search report.

(54) Title: **SHOULDER EXERCISING DEVICE**

(57) Abstract

The shoulder exercising device comprises two actuating arms (40) which are movable vertically and pivotable about horizontal axes (30) which are aligned with shoulder joints of the user. Each arm (40) is secured by a bearing sleeve (42) to a pinion gear (45) in meshing relation with a rack gear (65) such that movement of each arm (40) in each direction is resisted by a double-acting hydraulic cylinder (70) equipped with valves to provide precise resistance to each of the arms in each direction toward and away from a median plane P.



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SHOULDER EXERCISING DEVICE**BACKGROUND OF INVENTION**

Exercising devices heretofore devised for exercising adduction and abduction muscles of the shoulder have not provided double positive resistance to movement of the arms of a user from a position adjacent his sides to a position wherein the arms are extended laterally from his sides. Devices heretofore devised have comprised free weights, weights secured to a cable or springs and exerted resistance to movement in only one direction.

A fluid resistance type leg exerciser is disclosed in U.S. Patent No. 4,185,818, which provides double resistance to adduction and abduction movement of the legs of a user. A multi-purpose exercising device is disclosed in U.S. Patent No. 4,240,627, and a forearm exerciser is disclosed in U.S. Patent No. 4,258,913, each comprising devices to provide resistance to movement of a body member in opposite directions. However, no device has been devised heretofore which provides resistance to movement of abductor and adductor shoulder group muscles to produce a muscle-pumping action which aids the blood flow to the working muscle throughout the entire range of a repetition of an exercise.

DESCRIPTION OF DRAWING

Drawings of a preferred embodiment of the shoulder exercising device are annexed hereto, so that the



invention may be better and more fully understood, in which:

Figure 1 is a perspective view illustrating the front and left side of the shoulder exercising device;

5 Figure 2 is a perspective view illustrating the rear and left side of the device;

Figure 3 is a perspective view illustrating the rear and right side of the device;

10 Figure 4 is a fragmentary elevational view illustrating structure for adjusting the elevation of the seat relative to the axes of rotation of actuating arms;

15 Figure 5 is a fragmentary front elevational view of the upper portion of the frame and the pivot for the actuating arms;

Figure 6 is a fragmentary rear elevational view similar to Figure 5;

Figure 7 is a side elevational view illustrating arms of a user in a lowered position;

20 Figure 8 is a side elevational view similar to Figure 7 illustrating one arm of the user extended or elevated;

25 Figure 9 is a front elevational view illustrating the arms of the user in the position illustrated in Figure 7; and

Figure 10 is a front elevational view similar to Figure 9 illustrating the arms of the user in the extended or elevated position.

30 Numeral references are employed to designate like parts throughout the various figures of the drawing.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to Figures 1-3 of the drawing, the numeral 20 generally designates the improved shoulder
35 exercising device comprising a frame to which exercising



or actuating arms 40 are pivotally secured, movement of the arms being resisted by double acting hydraulic cylinders 70, as will be hereinafter more fully explained.

5 Referring to Figures 9 and 10 of the drawing, "P" designates a median plane passing through the center of the body of a user. Median plane P, as illustrated in Figures 9 and 10, is a vertical plane and is spaced equidistant between opposite sides of
10 the exercising device 20. As will be hereinafter more fully explained, the structure of the exercising device 20 lying on opposite sides of median plane P is a mirror image of the structure on the opposite side of the plane.

15 Abduction as used herein means movement away from the median plane P and adduction means movement toward the median plane P.

Referring to Figures 1 and 2 of the drawing, the frame of the exercising device comprises a generally
20 U-shaped base portion of unitary construction bent to provide side members 21, rear member 22 and downwardly extending front legs 24. A cross-brace 25 extends between side members 21 and is spaced from and generally parallel to rear member 22. Rear legs 26 are welded
25 or otherwise secured adjacent opposite ends of rear member 22 for maintaining side members 21 and rear member 22 in a plane which intersects and is perpendicular to median plane P.

The lower end of a tubular stanchion 28 is welded
30 or otherwise secured to a central portion of cross-brace 25. Stanchion 28, in the illustrated embodiment, lies in the median plane P and extends generally upwardly from cross-brace 25.

As best illustrated in Figures 5 and 6 of the
35 drawing, a beam 29 is secured to the upper end of



stanchion 28 to form a substantially T-shaped support for a seat assembly 50 and for actuating arms 40.

Stub shafts 30 are welded or otherwise secured adjacent opposite ends of beam 29, each shaft 30 being
5 spaced from and extending parallel to median plane P.

As best illustrated in Figures 7 and 8 of the drawing, each actuating arm 40 is shaped and configured to align the axis of pin 30 with the shoulder joint of the user. Each arm 40 comprises a sleeve 42 having
10 a pinion gear 45 welded or otherwise secured thereto for causing pinion gear 45 to rotate with sleeve 42. Sleeve 42 and pinion gear 45 are rotatably secured to stub shaft 30 and are restrained against movement longitudinally of pin 30 by a collar 44 immovably
15 secured to shaft 30 as by a set screw.

Arm 40 has a crank-arm portion 46 secured to sleeve 42 and a generally S-shaped lever portion 48 secured to the outer end thereof. The opposite end of lever portion 48 extends generally parallel to
20 crank-arm 46 to provide a pad support arm 49.

Seat assembly 50 comprises a back support 51 and a seat support 52 to which a seat back 53 and a bottom seat portion 54 are bolted or otherwise secured for forming a chair-like seat assembly 50.

25 As best illustrated in Figure 4, seat assembly 50 is adjustable longitudinally of stanchion 28 to permit movement of seat portion 54 of the seat assembly relative to stub shafts 30 for aligning the axis of rotation of actuating arms 40 with the axis of rotation
30 of the shoulder of a user. The seat adjustment mechanism, generally designated by the numeral 55 in Figures 3 and 4, comprises a channel member having a web portion and spaced flange portions to provide a pair of spaced lugs 56 secured to the seat back support
35 member 51 and slidable longitudinally of opposite



sides of stanchion 28. A pair of rollers 57 and 58 are rotatably secured adjacent upper and lower ends of lugs 56 and are positioned in rolling engagement with the rear surface of stanchion 28. A rack gear 60, having a plurality of teeth spaced longitudinally thereof is secured to stanchion 28. In the particular embodiment of the invention illustrated in Figure 4 of the drawing, wherein lugs 56 comprising flanges of a channel shaped member, the web of which is welded to back support member 51, the lower edge of the web is engagable with one of the teeth on rack gear 60. The weight of the seat assembly 50 applies a clockwise moment as viewed in Figure 4 of the drawing, about seat adjustment assembly 55, thereby moving the upper roller 58 into engagement with the rear surface of stanchion 28 and causing the web portion of the channel shaped member to be moved into engagement with one of the teeth on rack gear 60. It should be readily apparent that the elevation of the seat assembly 50 can be adjusted relative to stub shafts 30 by applying a counterclockwise moment, as by lifting seat portion 54 of assembly 55, thereby disengaging the lower edge of the web from the teeth on rack gear 60 and permitting vertical movement of seat assembly 50 longitudinally of stanchion 28. When the seat assembly is in the desired relationship relative to the axes of shafts 30, a downward force on the seat portion 54 will again cause the lower edge of the web adjacent the lower ends of lugs 56 to engage a selected tooth on rack gear 60.

As illustrated in Figures 5 and 6 of the drawing, rack support posts 62 are secured to beam 29 adjacent opposite sides of median plane P and have rack gear support blocks 63 secured thereto. Rack gear 65 is slidably disposed through rack gear bearing block 63



and is positioned such that teeth in rack gear 65 are in meshing relation with teeth on pinion gear 45.

Thus, it should be readily apparent that rotation of the crank-arm portion 46 of actuating arm 40 imparts rotation to sleeve 42 and pinion gear 45 about stub shaft 30 thereby imparting longitudinal movement to rack gear 65.

A double-acting pressure actuated cylinder 70 is pivotally secured by a pin 71 to stanchion 28 and the rod 72 of the cylinder 70 is pivotally secured by a self-aligning bearing 75 to the end of rack gear 65. Thus, longitudinal movement of rack gear 65 extends and retracts the rod 72 through cylinder 70.

Each cylinder 70 is provided with a valve element 74 having a plurality of orifices of different sizes to permit adjustment of the flow of hydraulic fluid from one end of the cylinder to the other, on opposite sides of the piston slidably disposed therein, to permit adjustment of resistance to rotation of pinion gear 45 and actuating arms 40. Cylinder 70 is preferably of the type disclosed and claimed in U.S. Patent No. 4,291,787, the disclosure of which is incorporated herein by reference in its entirety for all purposes.

Pressure gauges 80 and 81 are mounted on a support arm 82 and are connected by hydraulic hoses (not shown) to the respective pressure actuated hydraulic cylinders 70. Pressure gauges 80 and 81 are calibrated to indicate the magnitude of force exerted by the user on each of the actuating arms 40.

As best illustrated in Figures 1 and 2 of the drawing, each of the actuating arms 40 is provided with a padded roller 90 rotatably secured to the pad support arm portion 49, the roller 90 being disposed substantially parallel to the median plane P for engaging the outer portion of the arm of a user, as



illustrated in Figures 9 and 10 of the drawing. A generally rectangular pad 95 is pivotally secured to a pin 96 which is secured to the end of pad support arm 49. As illustrated in Figures 9 and 10, pad 95
5 engages the inside of the arm of the user and permits curling of the fingers around the edge of the pad to accommodate a downward force from the position as illustrated in Figure 10 of the drawing for movement of arms 40 toward median plane P.

10 To stabilize the body of the user, stirrups 98 are secured to side frame members 21 and comprise upper and lower rungs such that upon upward movement of actuating arms 40 from the position illustrated in Figure 9 toward the position illustrated in Figure
15 10, the user can exert a downward force on the lower rung of stirrup 98. When the user is exerting force for movement of actuating arms 40 from the position illustrated in Figure 10 toward the position illustrated in Figure 9, the user may position the upper portion
20 of the arch of his foot against the lower surface of the upper rung of stirrup 98 to facilitate exerting a downwardly directed force with each arm.



Having described the invention, I claim:

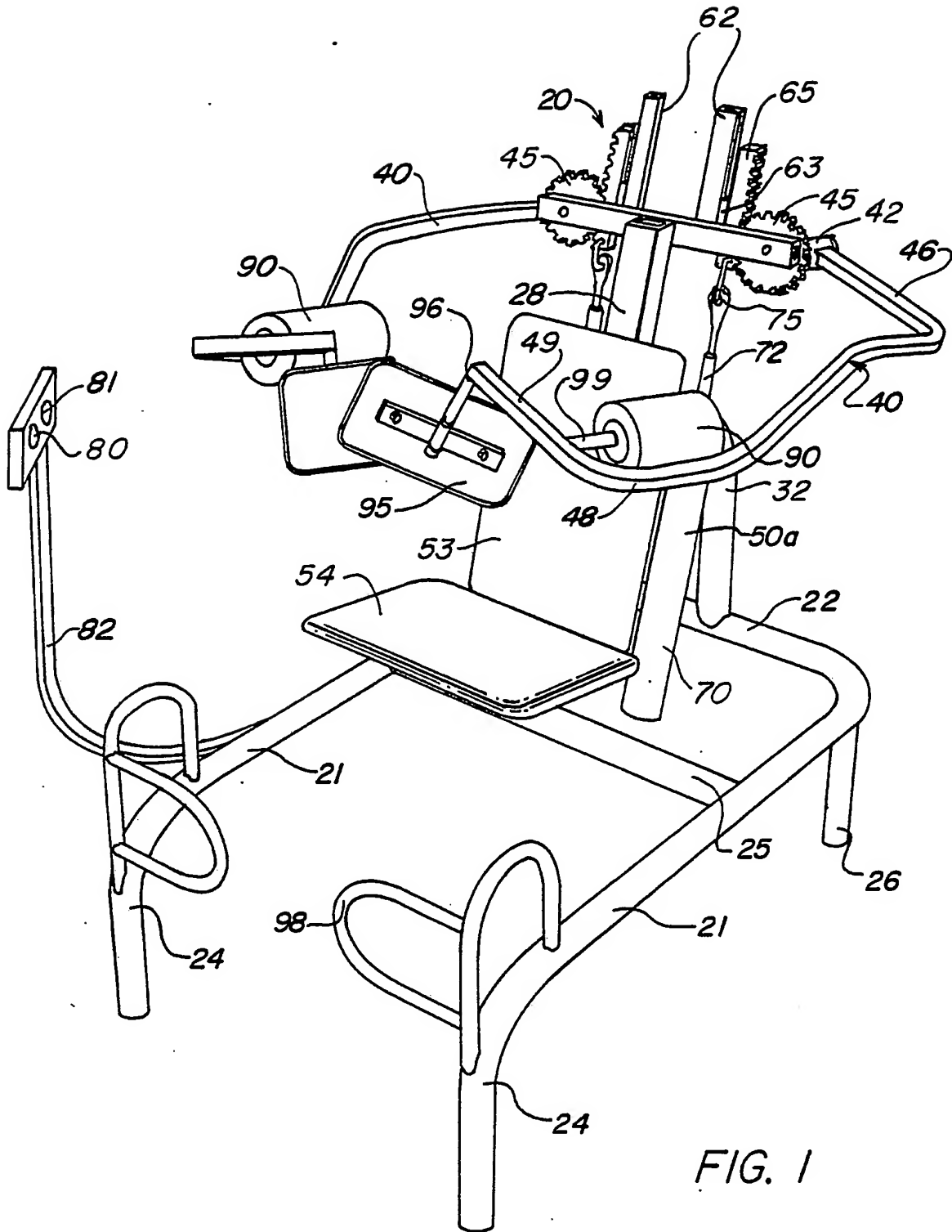
1. An exercising device comprising: a frame; a pair of actuating arms; means pivotally securing said actuating arms to rotate about spaced axes extending through shoulder joints of a user adjacent opposite sides of a median plane passing through the body of the user; and means secured to each actuating arm independently resisting movement of each actuating arm in directions toward and away from the median plane.
2. An exercising device according to Claim 1, each actuating arm comprising: a generally S-shaped lever portion; a crank-arm secured to one end of the lever portion; a pad support arm on the other end of the lever portion; and a bearing sleeve on said crank portion; said means resisting movement of each actuating arm being secured to said bearing sleeve.
3. An exercising device according to Claim 1, with the addition of a seat assembly; seat adjustment means securing said seat assembly to said frame for movement relative to the spaced axes about which said actuating arms rotate to accommodate users of different heights.
4. An exercising device according to Claim 3, said seat adjustment means comprising: a channel member having a web and a pair of spaced flanges; a rack gear secured to said frame and disposed between said flanges; and means to selectively secure said web to said rack gear to adjust spacing between said seat assembly and said spaced axes.



5. An exercising device according to Claim 1, said means independently resisting movement of each actuating arm comprising: a pinion gear on each actuating arm; a rack gear on said frame engaging each pinion gear; and a double acting pressure actuated motor resisting movement of said rack gear.



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SUBSTITUTE SHEET



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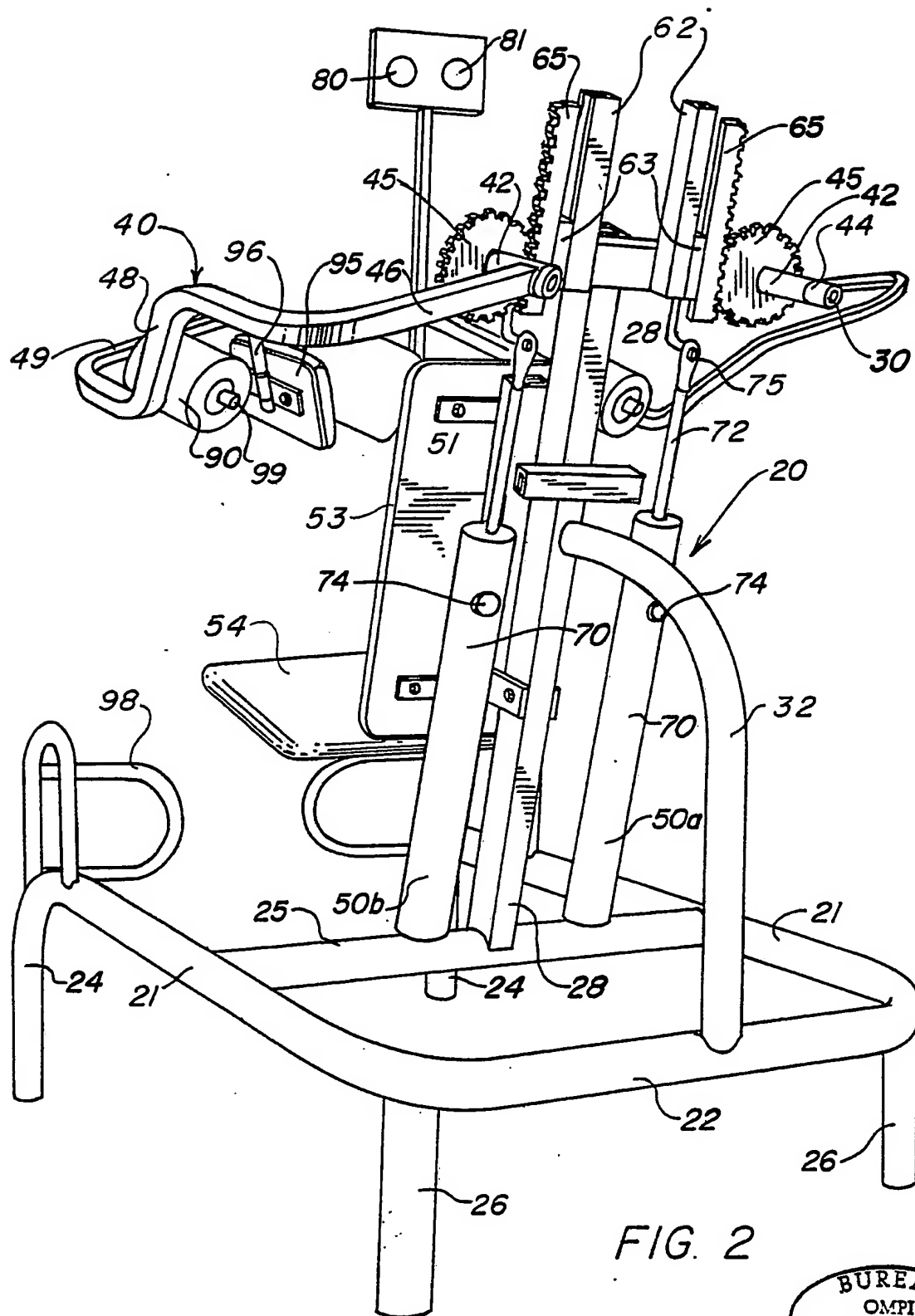


FIG. 2

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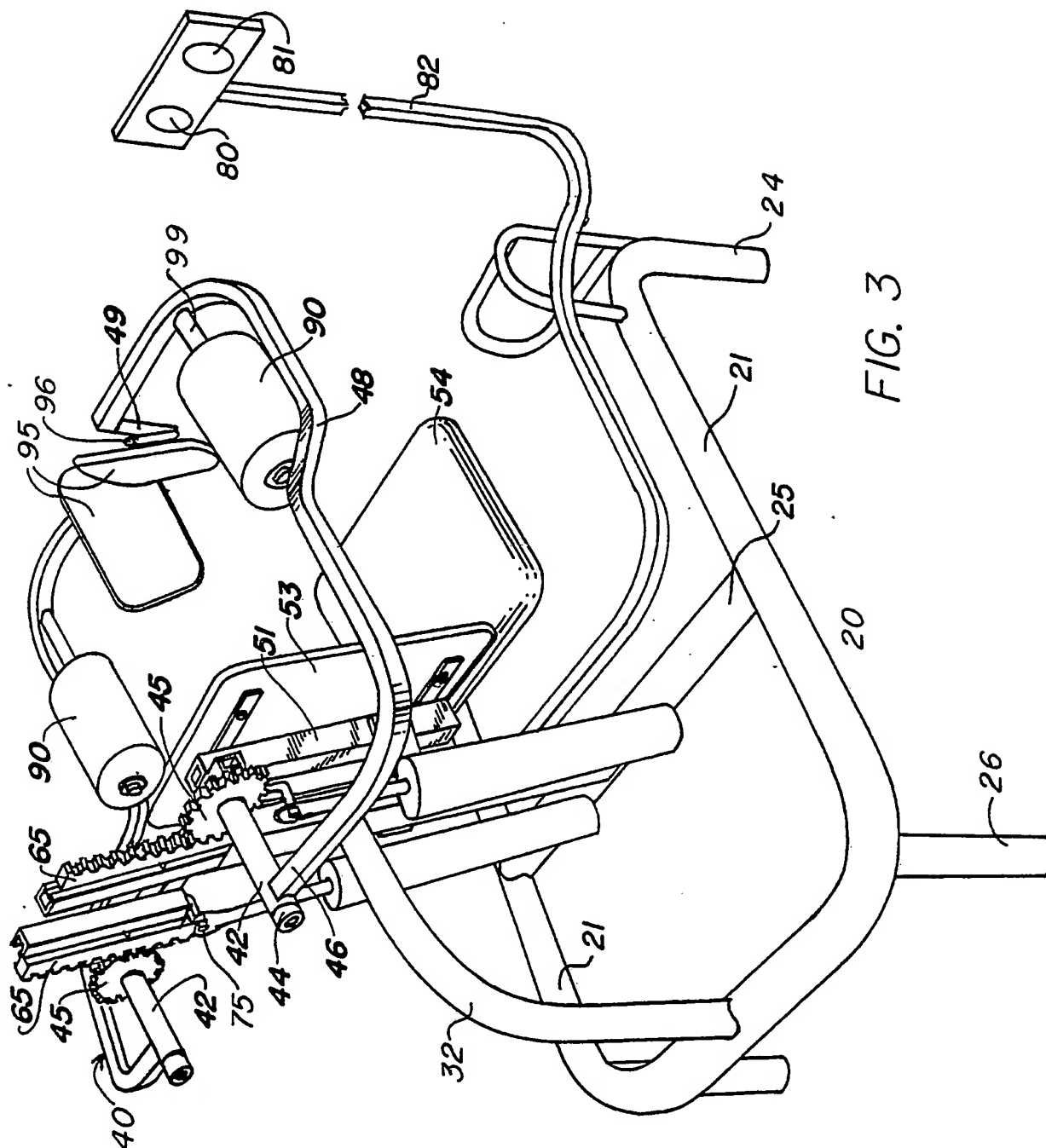


FIG. 3

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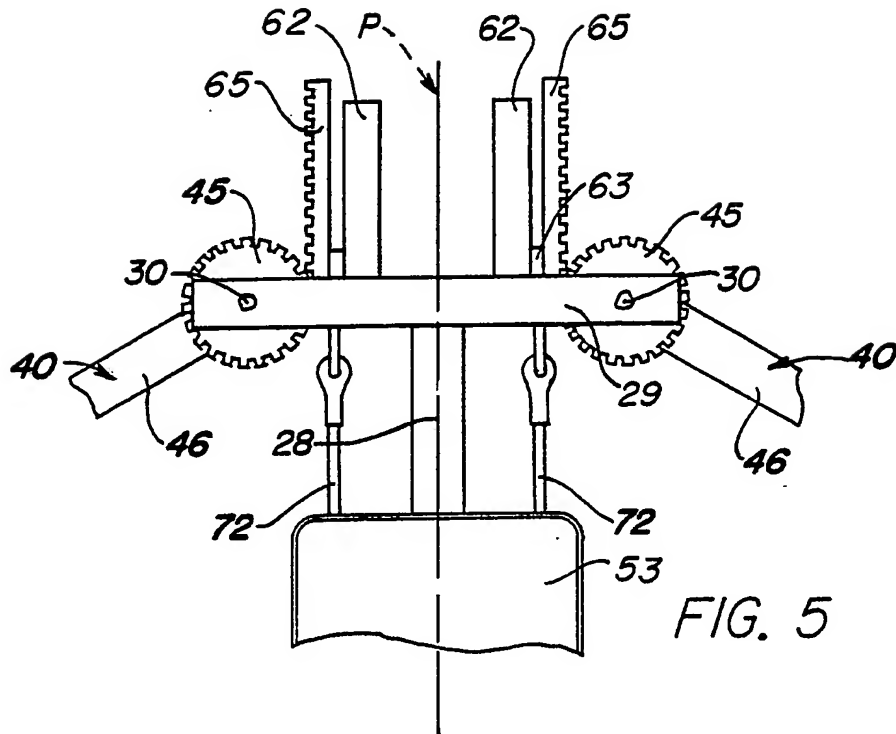


FIG. 5

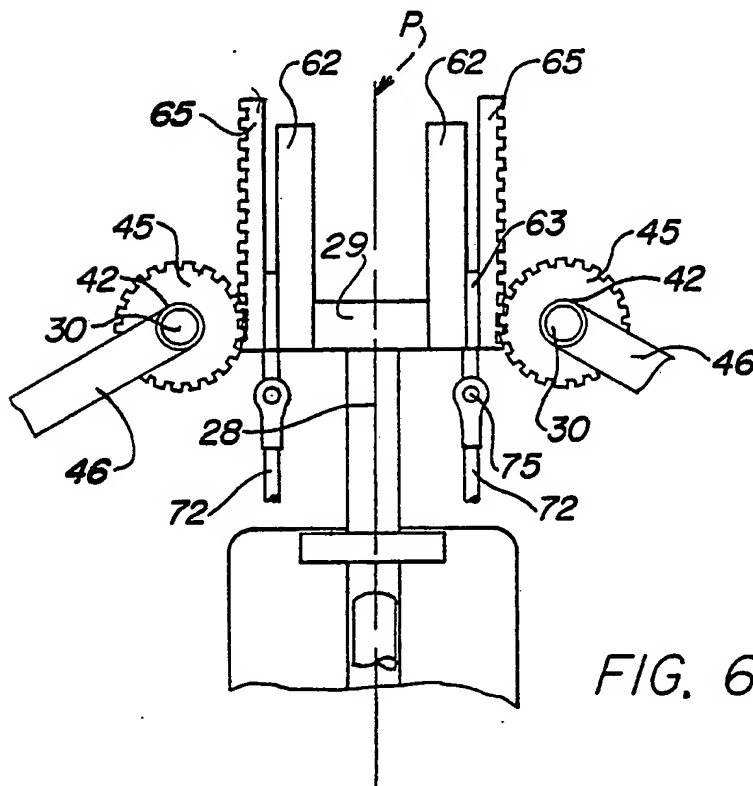


FIG. 6

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FIG. 7

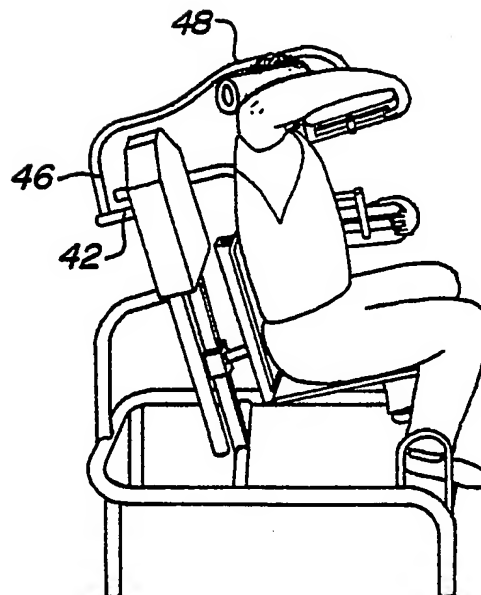


FIG. 8

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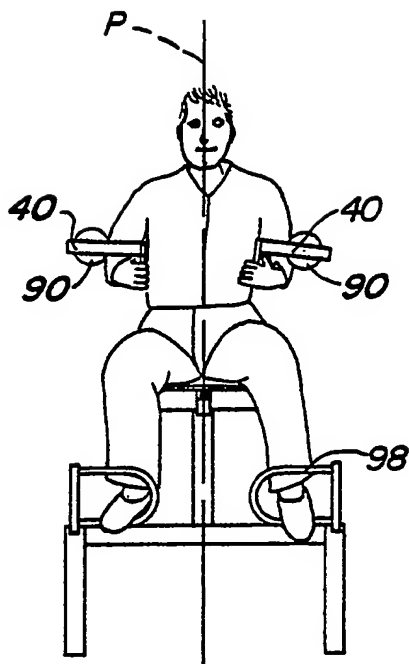


FIG. 9

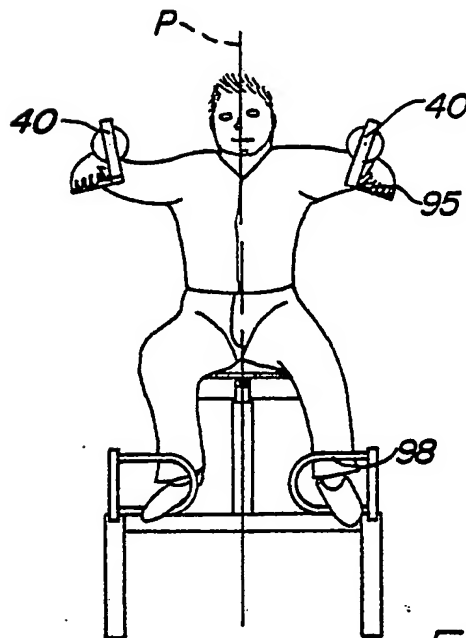


FIG. 10

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INTERNATIONAL SEARCH REPORT

International Application No **PCT/US84/01582**

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ³

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl. 272/134

U.S. Cl. 3 A63B 21/00

II. FIELDS SEARCHED

Minimum Documentation Searched ⁴

Classification System	Classification Symbols
US	272/128 272/134 272/130

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched ⁵

III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴

Category ⁶	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
Y	US, N, <u>Athletic Journal</u> , November 180, Page 3	1-5
Y	US, A, 4,185,818 29 January 1980 BRENTHAM	1-5
Y	US, A, 4,387,893 14 June 1983 BALDWIN (See Figures 2, 7 and column 2, line 63 to column 3, line 3.)	3-4
Y	US, A, 3,702,188 07 Nov. 1972 PHILLIPS et al (See column 3, lines 25-39.)	5

* Special categories of cited documents: ¹⁵

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IV. CERTIFICATION

Date of the Actual Completion of the International Search ¹

01 November 1984

International Searching Authority ¹

ISA/US

Date of Mailing of this International Search Report ²

20 NOV 1984

Signature of Authorized Officer ¹⁹

RICHARD J. APLEY

(WO/1985/001446) SHOULDER EXERCISING DEVICE

Biblio. Data

Description

Claims

National Phase

Notices

Documents

Latest published bibliographic data

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Applicant: HYDRA-GYM ATHLETICS, INC. .

Inventor: BRENTHAM, Jerry, Don .

Priority Data: 537,800 30.09.1983 US

Title: (EN) SHOULDER EXERCISING DEVICE
(FR) DISPOSITIF D'ENTRAÎNEMENT DES ÉPAULES

Abstract: (EN) The shoulder exercising device comprises two actuating arms (40) which are movable vertically and pivotable about horizontal axes (30) which are aligned with shoulder joints of the user. Each arm (40) is secured by a bearing sleeve (42) to a pinion gear (45) in meshing relation with a rack gear (65) such that movement of each arm (40) in each direction is resisted by a double-acting hydraulic cylinder (70) equipped with valves to provide precise resistance to each of the arms in each direction toward and away from a median plane P.

(FR) Ce dispositif d'entraînement des épaules comprend deux bras d'actionnement (40) qui peuvent se déplacer verticalement et pivoter autour d'axes horizontaux (30) alignés avec les articulations des épaules de l'utilisateur. Chaque bras (40) est fixé par un manchon à palier (42) sur un engrenage à pignon (45) en prise avec une crémaillère (65) de sorte qu'un cylindre hydraulique à double action (70) s'oppose au mouvement de chaque bras (40) dans chaque sens, le cylindre étant doté de soupapes permettant de réguler avec précision la résistance de chaque bras dans chaque sens en direction et en provenance d'un plan médian P.

Designated

States: AT, AU, BE, CH, DE, FR, GB, JP, LU, NL, SE.